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AUTHOR Rhoden, Bruce
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ABSTRACT

Included are three Learning Activity Package (LAP) studies for use in high school biology: Everything has a Place (Grouping and the Diversity of Life), Energy Relations, and Reproduction. Each LAP contains a rationale for teaching the material included, student objectives (stated in behavioral terms), a list of related resources (books, audiovisual aids), laboratory activities, and a student self-evaluation. (PEB)

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LEARNING ACTIVITY PACKAGE

EVERYTHING HAS A PLACE

(grouping and the diversity of life)

Ninety Six High School
Ninety Six, S.C.

BIOLOGY 102

DEVELOPED BY

LAP NUMBER 1

WRITTEN BY Bruce Rhodes

DATE UNIT AVAILABLE

1975

SE 018 182

RATIONALE

What do you think you would see if you could make a drop of water look as large as a basketball? Do you think you would find any living "creatures" swimming around in something so small? In this LAP we are going to try to find out what kinds of living things live in the world with us. Some you may have seen before, others will look as if they came from another world. In the next LAP we will investigate into how these living things affect each other.

Resources:

1. (tex) Patterns and Processes 2nd Ed. BSCS pp. 1-22
2. (PS) Pathways in Science Vol. 1 units 2 and 3
3. (Ils) Ideas and Investigations in Science Biology
4. How to Know the Insects a sample key
5. Assortment of Objects to be Grouped
6. Classification Chart
7. Compound and Disecting Microscope
8. Biological Investigations in Science Wong

Behavioral Objectives:

I. Given a bunch of objects or designs, you will group them into meaningful groups. By meaningful, I mean that you will be able to tell why you placed each object in a certain group instead of any other group.

Resources:

1. text (1-7)
2. box of assorted objects to be grouped
3. list of assorted objects

Activities:

1. Class discussion- The class will discuss the reason for useful grouping.
2. You will arange the objects provided by the instructor into groups and be able to tell why you placed them the way you did.
3. After reading pp. 3 & 4 in the text, with the class, you will list the main ideas presented. You may add or change your list after the class has discussed the main ideas.

II. List at least four characteristics of any good grouping system.

Resources:

1. text (3,4) Reading # 3

Activities

1. After reading # 3 you will list the main ideas and be ready to discuss the reading in class.

III. You will list and describe the characteristics that all living things have in common.

Resources:

1. Demonstration "Mercury Amebia"
2. Text (6 & 7) and reading # 5

Activities

1. After the class reads # 3 you will give a bried oral summary of its contents.

IV. Given a group of organisms you will be able to group them by structure. Be sure to follow the rules of a good grouping system learned earlier.

Resources:

1. Text (11, 12)
2. preserved and mounted specimens
3. f.s. "How Animals are Classified"

Activities:

1. "Guessing Game"
2. Text (11) Lab # 9
3. Text (13) Lab # 10

V. Given a description of a grouping system you will be able to tell the ones which are based upon structure from the ones which are not.

Resources:

Same as V

Activities:

1. You will be given a list of grouping systems and you will identify the ones which are based upon structure.

VI. You will demonstrate your ability to use a key by finding the name of a specified grouping when given a key. Example: find the name of the phylum group in which man is placed. (You would have a key to use)

Resources:

1. Text (12-28)
2. Classification chart
3. How to Know the Insects (A sample key)
4. Preserved and living organisms

Activities:

1. You will be given a set of organisms and you will attempt to find phylum and class groups to which they belong.
2. You will be given the grouping game and directions. You will complete the game until all cards are placed on the smallest groups on the board.

Advance Study:

Advanced study activities will be arranged between the individual student and the teacher.

Section II "Tiny Critors"

Behavioral Objectives:

After completing the activities you will be able to perform the following when required.

1. You will be able to prepare either a wet or dry mount and focus the slide on low and middle powers.

Resources:

1. 11S "Invest. 3" p. 53
2. Handout "The Microscope"
3. Text p. 10 "Reading 8 & 10"
4. How to Know the Protozoa by Jahn
5. F.S. "The Protist Kingdom"

Activities:

1. Teacher demonstration
2. Class discussion "The Microscope as a Tool"
3. ~~Tab~~ Text "INV. 3"
4. Bring a small container of "OLD" water from around your house. Prepare a wet mount and find as many livnig things as you can. Using your text and other books provided see if you can find the name of the organisms.

II. You will be able to predict what unit all living things are composed of based upon your observation.

Resources:

1. The microscope (compound and disecting)
2. 11S (Inv. 5) p. 65-68

3. Text Lab 58, 59 and Reading 60 pp. 131-134
4. Prepare slides showing a variety of cell types.

Activities:

1. Class discussion
2. Lab "INV. 5" 11S
3. Reading # 60 text
4. Demon. "Cell Types" Look at the various microscopes that have been set up around the room and see if you can find the different kinds of cells that make up the structure of living things.

Take the LAP Test

Learning Activity Package

Energy

Features

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SE 018 182

RATIONALE

In the last LAP we saw that all living things are made up of cells, and that in order to be classified as a living organism it must also be able to reproduce, respond to stimuli, and metabolize. The last characteristic we will explore in greater detail in this LAP. We will discover what processes occur in cells and how chemicals are used by cells to make food and get energy.

SPECIAL INSTRUCTIONS

This section of your LAP is to be used with the cassette tapes. Unless otherwise stated, the resources will be taken from your textbook, Patterns and Processes.

You should bring this LAP to class each day and follow the tapes,so that when you finish a section, you will be able to do the things described in the Objectives.

Section 1 Energetics

I D E A 2

BEHAVIORAL OBJECTIVES:

After completing the resources and activities, you will be able to write the equation for photosynthesis.

1. You will be able to list the three conditions necessary for burning and the three products produced.
2. You will be able to describe the experiment performed by Lavoisier including your conclusion of their results.
3. You will be able to define respiration.

ACTIVITIES:

1. Complete Lab 45 (on page 96)
2. After reading page 109, answer the following questions and turn them into your teacher.

   (a) Why was ice put in the outer chamber?

   (b) What does the figure "27" represent?

   (c) Answer the three questions at the end of the reading.

   (d) Complete the chart below.

General Formula	Fuel	+ Oxygen	+ Starting Condition	= Carbon Dioxide	+ Water	+ Energy
Candle	wax	O_2	heat from match	CO_2	H_2O	heat/light
Coal	coal	O_2	fire	CO_2	H_2O	heat
you	?	O_2	?	CO_2	H_2O	heat
Guinea Pig	?	O_2	?	CO_2	H_2O	heat

I D E A 3

BEHAVIORAL OBJECTIVES:

1. You will be able to describe several ways in which burning and respiration are alike.
2. You will be able to describe some ways that burning is different from respiration.
3. You will describe at least three ways in which man has changed the balance between plants and animals.

ACTIVITIES:

1. Complete Lab 48 and answer and turn in the questions at the end of the Lab.

I D E A 4 and 5

BEHAVIORAL OBJECTIVES:

1. You will be able to define a calorie
2. You will be able to describe how the amount of energy a food contains can be measured.

ACTIVITIES:

1. Design an experiment to measure the energy that different foods contain. Turn in your plans for the teacher's approval.
2. Summarize the ideas presented in reading 51 and turn in.

I D E A 6

BEHAVIORAL OBJECTIVES:

1. You will be able to describe what a catalyst does.
2. You will be able to give some evidence that some type of catalyst are found in animal cells.
3. You will tell ways that catalyst and enzymes might regulate the energy supplied to cells.

ACTIVITIES:

1. Complete Lab 52 on page 119.
2. Complete the Self Evaluation and then take the PROGRESS TEST.

SELF EVALUATION

1. What two materials were placed in *both* tubes? _____ _____ and _____.
2. What material was placed in the second tube *only*? _____ _____
3. Below is a list of materials used in this part of the experiment. Circle the one factor that was the variable.
   Glass test tubes
   Sand
   Hydrogen peroxide (H_2O_2)
   Manganese dioxide (MnO_2)
4. Therefore, any reaction that occurred in the second tube that did not occur in the first tube was caused by _____ _____.
5. Circle each of the results you observed.
   Contents of test tube number 1 bubbled.
   Contents of test tube number 2 bubbled.
   Contents of test tube number 1 showed no reaction.
   Contents of test tube number 2 showed no reaction.
6. The bubbles were a gas and rose to the surface because they were lighter than the liquid. These bubbles were filled with (CO_2, O_2, H_2).
7. The bubbling must have been caused by the variable factor which was _____.
8. The manganese dioxide (was, was not) used up in the reaction.
9. To be sure of this, we could weigh the MnO_2 before and after the experiment. If the weight of MnO_2 remained the same, then the MnO_2 (was, was not) used up in the reaction.
10. The MnO_2 used in this experiment is called a *catalyst* (**cat**-a-list). Many other chemicals can serve as catalysts. How did the catalyst affect the reaction? Circle your answer.
    No effect
    Stopped the chemical reaction
    Slowed down the chemical reaction
    Speeded up the chemical reaction

11. Could the catalyst, MnO_2, be used over again? Yes? No? Think about this question. Watch the demonstration carefully before you decide on an answer.
12. List three properties of catalysts.

_____

_____

_____

The remaining questions refer to steps 2 through 4 in the procedure for 52/LABORATORY ACTIVITY. Refer to your data chart on page 119.

13. From the list below, select the variable in the second part of the experiment.
    Sand
    Hydrogen peroxide (H_2O_2)
    Manganese dioxide (MnO_2)
    Liver

14. Thus, the variable consisted of _____ material rather than nonliving mineral material.
15. Circle the observations you made when you used liver in this experiment.
    Oxygen was given off when unboiled liver was used.
    Boiling the liver reduced the reaction.
    Grinding the liver reduced the reaction.
    Little oxygen was given off when the liver was boiled.
    More oxygen was given off when ground liver was used than when a whole piece of liver was used.
16. If you had special equipment you could separate all of the liver from the material in the test tube. None of it would have disappeared during the reaction. Knowing this, can you conclude that liver contains a catalyst? Yes? No?

Watch the demonstration your teacher is about to do. Then answer the next question.

17. When a catalyst is made by a living thing, we call it an *enzyme* (en-zime). Liver (contains, does not contain) an enzyme.
18. A substance that has the following properties is called

_____.

Produced by an organism
Speeds up a chemical reaction
Is not used up in the reaction
Can be used again and again

Section II

I D E A 7

BEHAVIORAL OBJECTIVES:

1. Given the chemical symbol for a compound, you will be able to tell how many different elements are in it and also how many atoms of each element it contains.

   Example: How many atoms of oxygen (O) are contained in one molecule of H_2O.

2. You will be able to give the chemical symbol for each of the following: oxygen, hydrogen, carbon, nitrogen, sodium, potassium, calcium, and iron.

3. You will be able to identify the following: molecule, element, and compound when given in writing.

4. Given a model containing the required elements, you will be able to construct a model of glucose in no more than 30 minutes.

5. From a given model of a molecule, you will be able to tell how many atoms of each element and name each element contained in the molecule.

6. From a given model of a molecule, you will be able to write the chemical formula.

Resources: Readings

1. Patterns and Processes 2nd Ed. pp. 123-128

2. Pathways in Science Vol. one

Audio-Visuals:

1. Molecular Model Kit

2. Cassette Tape "Photosynthesis, Ideas 7-10"

I D E A 8

BEHAVIORAL OBJECTIVES:

1. After looking at several examples of plants and animals under the microscope, you will be able to tell what microscopic structures all had in common; that is of what units all organisms are made.

2. After completing the resources, you will be able to tell how animal cells are different than plant cells.

3. After completing the resources, you will be able to describe how living cells are different than dead cells.

Resources: Readings

1. Patterns and Processes pp. 130-134.

I D E A 9

BEHAVIORAL OBJECTIVES:

1. After completing the resources, you will be able to give one or more examples of diffusion.
2. After completing the resources, you will be able to list at least three factors which determine wheather or not a certain molecule will pass through the cell membrane.

Resources: Readings

1. Patterns and Processes 2nd Ed. pp. 135

Audio- Visuals:

1. Demonstrations - (a) Diffusion (b) Osomosis
2. Cassette Tape "Photosynthesis - Idea 9"

Activities:

1. Complete and have teacher check Review on page 136.

I D E A 10

BEHAVIORAL OBJECTIVES:

1. After completing the resources, you will be able to tell how active transport differs from diffusion.
2. After completing the resources, you will be able to list at least three examples where energy from respiration is used by the cell.

Resources: Readings

1. Patterns and Processes 2nd Ed. pp. 137-145

Audio-visuals:

1. Tape - "Photosynthesis - Idea 10"
2. Demonstration - Living unicelluar organisms

Self Evaluation

Here is a chance for you to see how much you know. Write a sentence or two to answer each question. Use a clean sheet of paper. Try to answer the questions without looking at your notes or the book. When you have finished check your answers with the teacher.

1. What is the covering or "skin" of an animal cell called?

2. What does a cell look like?

3. How does food get into a cell?

4. Which of the following is true about diffusion?

   A. Particles move from places of high concentration to places of low concentration.

   B. Particles move from places of low concentration to places of high concentration.

5. What happens to cells when an organism grows?

6. Name at least one factor which influences the speed at which a substance will diffuse through a membrane.

7. Have you learned some new ways in which organisms use energy? List a few ways.

TAKE THE LAP TEST.

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RATIONALE

All living forms must have the ability to reproduce itself if that form of life is to survive. In this LAP, we will learn that there are two basic types of reproduction, and our study will be an in depth look at the processes involved in sexual reproduction.

In the last section, we will study the development of a chick, in order, to learn something about our own growth.

Section I

BEHAVIORAL OBJECTIVES:

After completing the resources and activities, you will be able to complete the following objectives on a written or oral test.

1. You will be able to tell what evidence led people to the theory of Spontaneous generation.

2. You will be able to identify the control in a given description of an experiment taken from the experiments discussed in class.

3. You will be able to tell the differences between sexual and asexual reproduction.

4. You will be able to give at least two examples of asexual reproduction.

5. You will be able to use the following words in a discussion of sexual reproduction.

   a) sperm
   b) ova (egg)
   c) zygote
   d) gamete

6. You will be able to identify the following parts of a flower and give their function if you are given a flower or drawing containing these parts.

   a) sepal
   b) petal
   c) pistil
   d) stamen
   e) ovary
   f) pollen
   g) ovule

7. You will be able to describe what takes place during fertilization of a flowering plant.

8. You will be able to describe the effects of hormones on reproductive behaviors in animals.

9. You will be able to tell what effect the hormones testosterone and estrogen have on the development of animals such as chickens.

RESOURCES

Readings:

1. Patterns and Processes 2nd ed. pp. 151-174
2. Life, Its Forms and Changes pp. 288-290

Visuals:

20. The Dicot: Basic Dissection Eye-Gate F. S.
21. The Monocot: Basic Dissection Eye-Gate F. S.
22. Flower model

SELF EVALUATION

1. Give two examples of sexually reproducing organisms.

   1. 2.

2. Define the following words.

   (a) ova

   (b) sperm

   (c)
   (c) zygote

3. What effect does estrogen have on the sexual development of chickens?

Take the Progress Test.

Section II

BEHAVIORAL OBJECTIVES:

After completing the resources and activities, you will be able to complete the following objectives on a written or oral test.

10. You will be able to label and pronounce the following male reproductive organs on a given diagram of the structures.

    a) scrotum
    b) testes
    c) penis
    d) urethra

11. You will be able to label and pronounce the following female reproductive ograns on a given diagram of the structures.

    a) ovary
    b) vterus
    c) urethra
    d) vagina

12. Based upon your understanding of the process of ovulation, you will be able to describe the role played by the follicle and corpus luteum.

13. After working through program 91, you will show your understanding of the menstrual cycle by being able to tell how hormones control the different events and the order in which the events occur.

14. After completing the laboratory on chick development, you will be able to describe the functions of the following structures.

    a) yolk sac
    b) allantois
    c) amnion
    d) chorion

15. After completing the laboratory on chick development, you will be able to identify the following structures on a given chick embryo or a drawing of the embryo.

    a) somites
    b) future eyes
    c) heart
    d) blood vessels

16. You will be able to tell the functions of the following structures in a human fetus.

    a) placenta
    b) umbilical cord
    c) amnion

17. You will be able to describe the changes that occur in a human fetus heart that makes it possible for the fetus to change from receiving oxygen from the mother to receiving oxygen from its own lungs.

18. After completing the resources and activities, you will show your understanding of the material covered by being able to answer the following questions.

1. How do materials get into the frog?
2. How do waste products get out of the frog embryo?
3. What special structures do the chick embryo have to get food and oxygen and get rid of waste products?
4. What special structure does the human have to get rid of waste products?
5. Why have membranes developed in the chicken egg and not in the frog egg?
6. What would happen to the chick embryo if the chicken egg did not have a shell?

Resources

Reading:

1. Patterns and Processes 2nd Ed. 175-215

Visual:

20. Model "Male Reproductive system
21. Model "Female Reproductive System
22. Model "Menstrual Cycle"
23. "Human Reproduction" F S. set

Handouts:

30. Male Reproductive System
31. Female Reproductive System